

## CLAIMS

What is claimed is:

1. A relay comprising:

at least one support member;

at least one first contact carried by one of the support members;

5 a bi-stable armature forming a first bearing surface and carried by one of the support members for movement between first and second stable positions when force is applied to the first bearing surface;

at least one second contact operatively positioned with respect to the armature such that the at least one second contact one of opens and closes with the at least one first contact when the armature is in the first position and the other of  
10 opens and closes with the at least one first contact when the armature is in the second positions;

an operator forming a second bearing surface and carried by one of the support members for movement between an activated position and a deactivated position; and

15 a push arm forming a distal end and a push surface, the push arm carried by one of the support members, each of the distal end and the push surface proximate one or the other of the first and second bearing surfaces;

wherein, one of the distal end and the push surface engages one of the first and second bearing surfaces and the other of the distal end and the push  
20 surface engages the other of the first and second bearing surfaces when the armature is in the second position and the operator is moved from the deactivated position toward the activated position thereby applying force to the first bearing surface, the distal end disengaging the one of the first and second bearing surfaces when the armature has moved to the first position.

25 2. The relay of claim 1 wherein the at least one support member includes at least first and second support members and wherein the armature is carried by the first support member and the push arm is carried by the second support member.

3. The relay of claim 2 wherein the first and second support members are first and second housing members, respectively.

4. The relay of claim 3 wherein the first housing member forms a housing recess open to one side, the armature is mounted within the recess and the second housing member forms a cover that substantially closes the recess opening.

5. The relay of claim 4 wherein the operator is mounted to the first housing member.

6. The relay of claim 5 wherein the distal end is proximate the second bearing surface.

7. The relay of claim 1 wherein the at least one second contact is open with respect to the at least one first contact when the armature is in the first position.

8. The relay of claim 7 wherein the at least one first contact includes at least two first contacts and wherein the at least one second contact includes at least two second contacts.

9. The relay of claim 8 further including at least two third contacts and at least two fourth contacts, the at least two fourth contacts operatively positioned with respect to the armature such that, the at least two fourth contacts are closed with the at least two third contacts when the armature is in the first position and are open with  
5 the at least two third contacts when the armature is in the second positions.

10. The relay of claim 7 wherein the push arm is juxtaposed such that when the operator is in the deactivated position and the armature is in the first position, the push arm is separated from each of the bearing surfaces.

11. The relay of claim 1 wherein the distal end is proximate the second bearing surface.

12. The relay of claim 1 wherein the operator is a push button.

13. The relay of claim 2 wherein the push arm includes a first leg member mounted at a first end to the first support member, a second leg member extending from the first leg member proximate a second end of the first leg member and to one side of the first leg member thereby forming an angle with the first leg member, the  
5 end of the second leg member opposite the first leg member forming the distal end, a surface of the first leg member facing in the direction opposite the direction in which the second leg member extends forming the push surface.

14. The relay of claim 13 wherein the push arm is plastic.

15. The relay of claim 13 further including a push arm spring member mounted to the push arm and biasing the push surface toward the one of the first and second bearing surfaces proximate the push surface.

16. The relay of claim 15 wherein the push arm spring is mounted between the push arm and the second support member.

17. The relay of claim 15 further including a stop member extending from the second support member, the spring member holding the push arm against the stop member so that, when the armature is in the first position, the push surface is separated from the proximate bearing surface.

18. The relay of claim 17 wherein the push arm further includes an arm member that extends from the second end of the first leg member and forms an angle with the second leg member, the push arm spring member holding the arm member against the stop member.

19. The relay of claim 19 wherein the arm member is substantially parallel to the first leg member and wherein the second leg member extends substantially perpendicular to each of the first leg member and the arm member.

20. The relay of claim 2 further including a leaf spring carried by the first member and carrying the at least one second contact, the armature including a cam member extending in the direction of the leaf spring and interacting with the leaf

spring to hold the at least one first contact and at least one second contact apart  
5 when the armature is in the first position.

21. The relay of claim 20 wherein the operator moves along an activation axis and wherein the cam extends substantially perpendicular to the activation axis when the armature is in at least one of the first and second positions.

22. The relay of claim 1 wherein the push arm is plastic.

23. The relay of claim 1 wherein the push arm includes at least a flexible member between the distal end and the push surface.

24. The relay of claim 1 wherein the push arm is juxtaposed such that when the operator is in the deactivated position and the armature is in the first  
5 position, the push arm is separated from each of the bearing surfaces.

25. The relay of claim 1 further including a post member extending from the first support member and juxtaposed with respect to the distal end of the push arm such that the post member forces the distal end from the one of the first and second bearing surfaces after the armature has moved to the first position.

26. A relay reset assembly for use with a relay including first and second support members, at least one first contact carried by one of the support members, a bi-stable armature forming a first bearing surface and carried by the first support member for movement between first and second stable positions when force is applied to the first bearing surface and at least one second contact operatively positioned with respect to the armature such that the at least one second contact one of opens and closes with the at least one first contact when the armature is in the first position and the other of opens and closes with the at least one first contact when the armature is in the second positions, the assembly for resetting the armature into the first position after the armature is tripped into the second position, the assembly comprising:

an operator forming a second bearing surface and carried by one of the first and second support members for movement between an activated position and a deactivated position; and

a push arm forming a distal end and a push surface, the push arm carried by the second support member, each of the distal end and the push surface proximate one or the other of the first and second bearing surfaces;

wherein, one of the distal end and the push surface engages one of the first and second bearing surfaces and the other of the distal end and the push surface engages the other of the first and second bearing surfaces when the armature is in the second position and the operator is moved from the deactivated position toward the activated position thereby applying force to the first bearing surface, the distal end disengaging the one of the first and second bearing surfaces when the armature has moved to the first position.

27. The assembly of claim 26 wherein the distal end is proximate the second bearing surface.

28. The assembly of claim 26 wherein the push arm is juxtaposed such that when the operator is in the deactivated position and the armature is in the first position, the push arm is separated from each of the bearing surfaces.

29. The assembly of claim 26 wherein the push arm includes a first leg member mounted at a first end to the first support member, a second leg member extending from the first leg member proximate a second end of the first leg member and to one side of the first leg member thereby forming an angle with the first leg member, the end of the second leg member opposite the first leg member forming the distal end, a surface of the first leg member facing in the direction opposite the direction in which the second leg member extends forming the push surface.

30. The assembly of claim 29 further including a spring member mounted to the push arm and biasing the push surface toward the one of the first and second bearing surfaces proximate the push surface.

31. The assembly of claim 29 wherein the spring is mounted between the push arm and the first support member.

32. The assembly of claim 29 further including a stop member extending from the second support member, the spring member holding the push arm against the stop member so that, when the armature is in the first position, the push surface is separated from the proximate bearing surface.

33. The assembly of claim 26 wherein the push arm is juxtaposed such that when the operator is in the deactivated position and the armature is in the first position, the push arm is separated from each of the bearing surfaces.

34. A relay reset assembly for use with a relay including first and second support members and a bi-stable armature forming an armature bearing surface and carried by the first support member for pivotal movement between first and second stable positions when force is applied to the armature bearing surface, the assembly  
5 for resetting the armature in the first position after the armature is tripped into the second position, the assembly comprising:

an operator forming an operator bearing surface and carried by one of the first and second support members for movement between an activated position and a deactivated position; and

10 a push arm forming first and second arm bearing surfaces, the push arm carried by the second support member and juxtaposed such that each of the first and second arm bearing surfaces is proximate one or the other of the operator and armature bearing surfaces;

wherein, one of the first and second arm bearing surfaces engages one of  
15 the operator and armature bearing surfaces and the other of the first and second arm bearing surfaces engages the other of the operator and armature bearing surfaces when the armature is in the second position and the operator is moved from the deactivated position toward the activated position thereby applying force to the armature bearing surface, the one of the first and second arm bearing surfaces  
20 disengaging the proximate one of the operator and armature bearing surfaces when the armature has moved to the first position.

35. A relay comprising:

at least one support member;

at least one first contact carried by one of the support members;

a bi-stable armature forming a first bearing surface and carried by one of  
5 the support members for movement between first and second stable positions when force is applied to the first bearing surface;

at least one second contact operatively positioned with respect to the armature such that the at least one second contact one of opens and closes with the at least one first contact when the armature is in the first position and the other of  
10 opens and closes with the at least one first contact when the armature is in the second positions;

an operator forming a second bearing surface and carried by one of the support members for movement between an activated position and a deactivated position; and

15           a flexible push arm forming a distal end and a push surface, the flexible push arm juxtaposed such that each of the distal end and the push surface are proximate one or the other of the first and second bearing surfaces;

              wherein, one of the distal end and the push surface engages one of the first and second bearing surfaces and the other of the distal end and the push  
20   surface engages the other of the first and second bearing surfaces when the armature is in the second position and the operator is moved from the deactivated position toward the activated position thereby applying force to the first bearing surface, the distal end disengaging the one of the first and second bearing surfaces when the armature has moved to the first position.

25           36.    A relay comprising:

              at least one support member;

              at least one first contact carried by one of the support members;

              a bi-stable armature forming a first bearing surface and carried by one of the support members for movement between first and second stable positions when  
30   force is applied to the first bearing surface;

              at least one second contact operatively positioned with respect to the armature such that the at least one second contact one of opens and closes with the at least one first contact when the armature is in the first position and the other of opens and closes with the at least one first contact when the armature is in the  
35   second positions;

              an operator forming a second bearing surface and carried by one of the support members for movement between an activated position and a deactivated position; and

              a push arm forming a distal end and a push surface, the push arm carried  
40   by one of the support members, each of the distal end and the push surface proximate one or the other of the first and second bearing surfaces;

              wherein, one of the distal end and the push surface engages one of the first and second bearing surfaces and the other of the distal end and the push surface engages the other of the first and second bearing surfaces when the



45 armature is in the second position and the operator is moved from the deactivated  
position toward the activated position thereby applying force to the first bearing  
surface, the distal end disengaging the one of the first and second bearing surfaces  
when the armature has moved to the first position and, when the operator is in the  
deactivated position and the armature is in the first position, the push arm separated  
50 from each of the bearing surfaces.

37. A relay comprising:  
at least one support member;  
first and second contacts mounted to the at least one support member;  
a bi-stable armature mounted to the at least one support member with  
55 respect to at least one of the contacts to cause the contacts to one of open and close  
when moved from a first position to a second position and to the other of open and  
close when moved from the second position to the first position;  
an operator mounted to the at least one support for movement between an  
activated position and a deactivated position; and  
60 a trip free push arm linkage juxtaposed between the operator and the  
armature to transfer force from the operator to the armature tending to cause the  
armature to move toward the first position when the armature is in the second  
position and the operator is moved toward the activated position, the push arm  
linkage separated from each of the armature and the operator when the operator is  
65 in the deactivated position and the armature is in the first position.

38. The relay of claim 37 wherein the push arm disengages at least one of  
the operator and the armature when the armature has moved to the first position.